***Food Science***

***College of Applied Medical Sciences***

***Department of Environmental Health***

***Lecture 1******Introduction to Food Science***

Civilized man does not eat all the food as it is available in nature. He cuts, crushes, cools, processes and modifies in many ways before consuming, adding variety to the diet.

***DEFINITIONS***

***Food*** is defined as anything solid or liquid which when swallowed, digested and assimilated, nourishes the body. ***Food science*** is the study of the physical, biological, and chemical makeup of food; and the concepts underlying food processing.

***Food science*** is the [applied science](https://en.wikipedia.org/wiki/Applied_science) devoted to the study of [food](https://en.wikipedia.org/wiki/Food). The [Institute of Food Technologists](https://en.wikipedia.org/wiki/Institute_of_Food_Technologists) defines food science as "the discipline in which the engineering, biological, and physical sciences are used to study the nature of foods, the causes of deterioration, the principles underlying [food processing](https://en.wikipedia.org/wiki/Food_processing), and the improvement of foods for the consuming public". The textbook *Food Science* defines food science in simpler terms as "the application of basic sciences and engineering to study the physical, chemical, and biochemical nature of foods and the principles of food processing".

***Food Science*:** Food is a mixture of many different chemical components. The study of food science involves an understanding of the changes that occur in these components during food preparation whether natural or induced by handling procedures. Many physical and chemical reactions occur during food preparation. These reactions may be a result of the interaction between components, with the medium of cooking, and the environmental conditions like heat, cold, light and air to which they

are subjected during cooking. Study of food science also includes understanding the nutritive value of different foods and methods of preserving them during cooking. This information provides a foundation

of theory and method on which to build the study of food preparation.

Activities of food scientists include the development of new food products, design of processes to produce these foods, choice of packaging materials, [shelf-life](https://en.wikipedia.org/wiki/Shelf-life) studies, sensory evaluation of products using [panels](https://en.wikipedia.org/wiki/Survey_panel) or potential consumers, as well as microbiological and chemical testing. Food scientists may study more fundamental phenomena that are directly linked to the production of food products and its properties. ***Food technology*** is the application of food science to the selection, preservation, processing, packaging, distribution, and use of safe food.

***Food additive*** is defined as non-nutritive substances added intentionally to food, generally in

small quantities to improve its appearance, flavour, texture or storage properties.

***Fermented food*** is produced by the action of bacteria or moulds which act on carbohydrates and

proteins present in foods and hydrolyse them to simpler products yielding predigested foods.

***Food Technology*** is the application of principles of food science and engineering to the processing

and preserving large quantities of food.

***Food fortification*** is defined as the process whereby nutrients are added to foods in relatively

small quantities to maintain or improve the quality of the diet of a group, a community or a population.

(WHO).

***Non-nutrients of foods*** are organic compounds having no nutritional function. They may be toxins

or beneficial substances like fiber or compounds that may improve palatability or pharmacological

importance.

***Functional food*** provides health benefits beyond the nutrient contribution ***Phytochemicals*** are non-nutrient compounds found in plant derived food that have biological activity in the body.

***Food safety and regulation*** is related to food sanitation in public health and rules and regulations governing it.

***Antioxidants*** include compounds that protect biological systems against the potentially harmful effects of processes or reactions that can cause excessive oxidations .

***FUNCTIONS OF FOOD***

Foods are classified according to their functions in the body.

***Energy yielding***

This group includes foods rich in carbohydrate, fat and protein. One gram of carbohydrate gives 4calories. One gram of protein gives 4 calories. One gram of fat gives 9 calories. This group may be broadly divided into two groups:

• Cereals, pulses, nuts and oilseeds, roots and tubers.

• Pure carbohydrates like sugars and fats and oils.

Cereals provide in addition to energy large amounts of proteins, minerals and vitamins in the diet. Pulses also give protein and B vitamins besides giving energy to the body. Nuts and oilseeds are richin energy yielding as they are good sources of fats and proteins. Roots and tubers though mainly provide energy, they also contribute to some extent to minerals and vitamins. Pure carbohydrates like sugars provide only energy (empty calories) and fats provide concentrated source of energy and fat soluble vitamins.

***Body building***

Foods rich in protein are called body-building foods. They are classified into two groups:

• Milk, egg, meat, fish: They are rich in proteins of high biological value. These proteins have all

the essential amino acids in correct proportion for the synthesis of body tissues.

• Pulses, oilseeds and nuts: They are rich in protein but may not contain all the essential amino acids required by the human body.

***Protection and regulation***

Foods rich in protein, vitamins and minerals have regulatory functions in the body e.g., maintaining the heart beat, water balance, temperature. Protective foods are broadly classified into two groups.

• Foods rich in vitamins and minerals and proteins of high biological value e.g., milk, egg, fish, liver.

• Foods rich in certain vitamins and minerals only e.g., green leafy vegetables and fruits.

**Maintenance of health**

Food contains certain phytochemicals and antioxidants which help in preventing degenerative diseases.

Food plays an important role in the prevention of cancers, heart diseases and in controlling diabetes mellitus.

Some examples for functional foods are whole grains, soya bean, green leafy vegetables, coloured fruits and spices.

***FOOD GROUPS***

Foods have been classified into different groups depending upon the nutritive value, for the convenience of planning diets. Food groups like ‘Basic four’, ‘Basic five’ or ‘Basic seven’ can be used for planning

diets as per the convenience.

***I Basic Four***

***Group******Nutrient***

1• Cereals, millets and pulses ( Energy, protein B-vitamins)

2• Vegetables and fruits (Vitamins, minerals and fiber)

3• Milk, milk products, and animal foods ( Protein, calcium ,B-vitamins)

4• Oils, fats, nuts and oilseeds (Energy, protein)

***II Basic Five: ICMR***

1 • Cereals, grains and products: rice, wheat, ragi, maize, bajra, jowar, rice flakes, puffed . (Energy, protein, invisible fat, thiamin,folic acid, riboflavin, iron and fiber).

2• Pulses and legumes: Bengal gram, black gram, cow pea, peas (dry) rajma, soya beans. (Energy, protein, invisible fat, thiamin, riboflavin, folic acid, calcium, iron and fiber).

3• Milk and meat products: ( Protein, fat, riboflavin,

\* Milk, curd, skimmed milk, cheese calcium, protein, fat, riboflavin).

\* Chicken, liver, fish, egg and meat.

4• Fruits and vegetables:

\* Mango, guava, tomato, papaya, (Carotenoids, vitamin C, riboflavin,

orange, sweet lime, watermelon. folic acid, iron, fiber).

\* Green leafy vegetables: (Riboflavin, folic acid calcium, fiber,

Amaranth spinach, gogu, drumstick iron, carotenoids).

leaves, corriander leaves, fenugreek.

\* Other vegetables:

Carrots, onion, brinjal, ladies finger, (Carotenoids, folic acid, calcium

beans, capsicum, cauliflower, and fiber).

drumstick.

5• Fats and Sugars:

\* Fats: Butter, ghee, (Energy, essential fatty acids

genated fat, cooking oils. and fat soluble vitamins).

\* Sugar. ( Energy).

***III Basic Seven***

1• Green and yellow vegetables ( Carotenoids, ascorbic acid, and iron).

2• Oranges, grape fruit, tomatoes or (Ascorbic acid).

raw cabbage.

3• Potatoes, other vegetables (Vitamins and minerals in general

and fruits and fiber).

4• Milk and milk products (Calcium, phosphorus, protein and vitamins) .

5• Meat, poultry, fish and eggs (Proteins, phosphorus, iron

and B vitamins).

6• Bread, flour and cereals ( Thiamin, niacin, riboflavin, iron,

carbohydrate and fiber).

7• Butter or fortified margarine ( Vitamin A and fat`).